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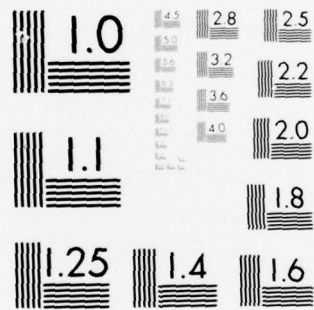


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**Book 21**  
**Right-of-Way Opportunities**  
**and Avoidance Features**

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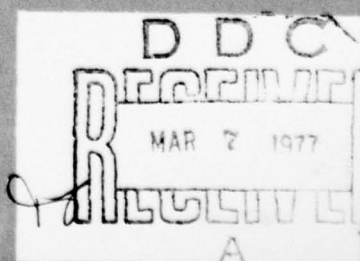
# Seafarer Site Survey Upper Michigan Region

**for**  
**U.S. Navy**  
**Naval Electronic Systems Command**  
**Washington, D.C.**

**by**  
**EDAW inc.**  
**under contract to**  
**GTE Sylvania**  
**Communication Systems Division**

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<p>This report identifies right-of-way opportunities and avoidance features that occur within the Study Area. In order to identify opportunities and avoidance features, all environmental features of the area were examined relative to the following types of costs: construction; mitigation; operation and maintenance; biological costs (impacts); and social costs (impacts).</p> <p>The information is condensed into two maps which plot right-of-way opportunities and the locations of avoidance features, respectively.</p>		

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BOOK 21

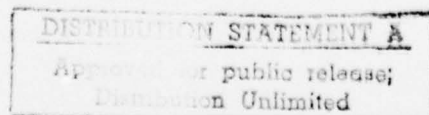
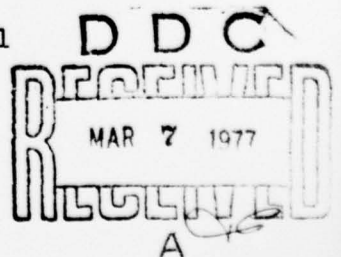
RIGHT-OF-WAY OPPORTUNITIES  
AND AVOIDANCE FEATURES  
of the  
UPPER MICHIGAN REGION  
PROJECT SEAFARER

for  
U. S. Navy. Naval Electronic Systems Command

by  
EDAW, Inc., 50 Green Street, San Francisco 94111

Under Contract to  
GTE Sylvania, Communication Systems Division

April, 1976





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## GENERAL DESCRIPTION

This report identifies right-of-way opportunities and avoidance features that occur within the Upper Michigan Study Area. Right-of-way opportunities are defined as all existing rights-of-way that have potential for use as a SEAFARER antenna right-of way, such as roads, transmission lines, telephone lines and abandoned railroads. Avoidance features are those areas within the Study Area that have been excluded from consideration for antenna siting due to high constraints, such as incorporated settlements, lakes, and unique natural areas.

The Site Survey report, of which this book is a part, will form the basis for identifying opportunities and constraints to SEAFARER system siting in each environmental data category. ROW opportunities and avoidance features represent the two extreme ends of the spectrum with all other data factors falling somewhere between in terms of level of constraint. Further definition of constraint levels by data category is beyond the scope of this site survey effort and will be the subject of a follow-on phase of work. The avoidance feature map represents the initial examination and identification of site characteristics that represent constraints to SEAFARER siting.

In order to identify opportunities and avoidance features, all environmental features of the Study Area were examined relative to five types of costs or impacts:

- o Construction costs are associated with antenna system construction and include such items as right-of-way acquisition, access roads, construction, vegetative clearing, dewatering, blasting, materials storage, equipment movement, field testing, waste disposal and environmental restoration.
- o Mitigation costs are associated with precluding electrical interference in telephone and utility distribution systems and induced coupling with long wire conductors such as fences. Examples of costs include upgrading single phase electrical distribution lines to three phase balanced lines, grounding long wire fences and upgrading rural telephone systems to eliminate interference.
- o Operation and maintenance costs include all costs required for reliable system transmission, surveillance, preventive maintenance and repair.

- o Biological costs (or impacts) include alteration of environmental features leading to loss of habitat, vegetative destruction, depletion of wildlife species or imbalance of the ecosystem. Biological impacts in this context refer to siting, construction, and maintenance activities; considerations relative to the operation of an ELF system are beyond the scope of this report.
- o Social costs (or impacts) include the restriction of existing or planned land use and potential effect on land values, employment, local services, public health, education, safety, recreation and historic or archaeological sites; also included is the more subjective area of public acceptability.

Right-of-way opportunities have been identified to minimize both engineering and environmental costs in siting; avoidance features have been identified to minimize social, environmental and mitigation costs.

#### Right-of-way Opportunities

Right-of-way opportunities are shown on the map on the following page. The information has been extracted directly from the Transportation Data Map (Book 7) and the Utilities Data Map (Book 8). Opportunities are linear in configuration and generally transect the site in a north-south and east-west direction. Table 1 lists each type of feature located on the map.

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Table 1. RIGHTS-OF-WAY OPPORTUNITIES

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<u>Data Category</u>	<u>Data Factor</u>	<u>Minimizes:</u>
Transportation	Highways Paved Roads Gravel Roads Dirt Roads Abandoned Railroads	construction cost operation and maintenance cost biological cost social cost
Utilities-Electrical	Transmission Lines Distribution Lines Underground Cables	construction cost operation and maintenance cost biological cost social cost
Utilities-Telephone	Underground Cables Aerial Cables Open Wires	construction cost operation and maintenance cost biological cost social cost

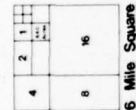
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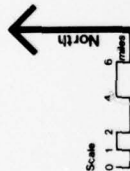
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6 Mile Square



## R.O.W. OPPORTUNITIES

**TRANSPORTATION**  
U.S. and State Highways  
Other Paved Roads  
Gravel Road  
Good Dirt Road  
Poor Dirt Road  
Abandoned Railroad



**ELECTRICAL TRANSMISSION AND DISTRIBUTION SYSTEM**  
Transmission Line (69KV-138KV)  
Three Phase Distribution Line (12.5KV-33KV)  
Single Phase Distribution Line  
Underground Cable  
Substation  
Switching Station  
Generation Station



**TELEPHONE SYSTEM**  
Underground Cable  
Open Wire  
Aerial Cable  
Central Office



+ 88° 45'

+ 88° 30'

+ 88° 15'

+ 88° 00'

+ 87° 45'

+ 87° 30'

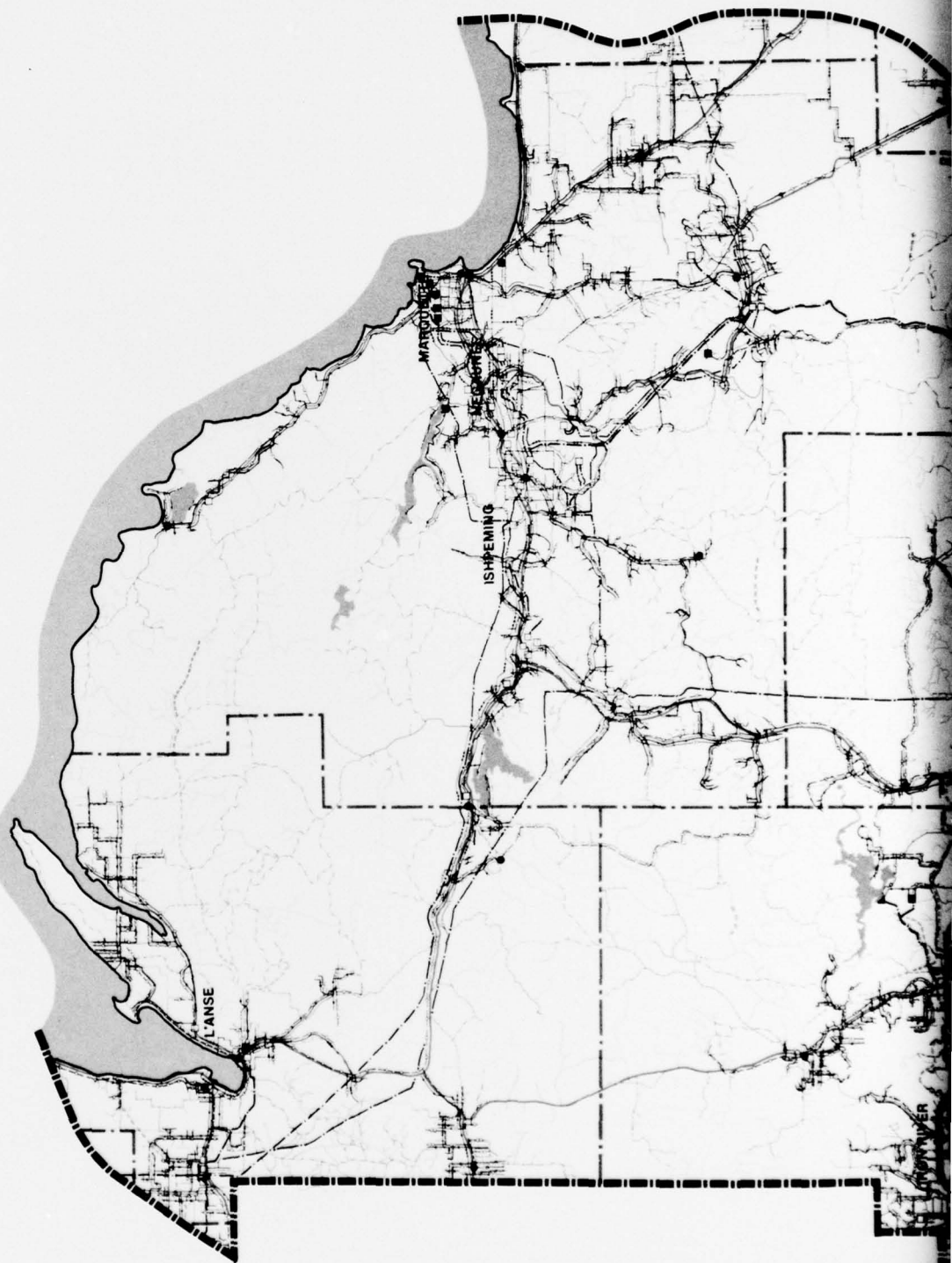
+ 87° 15'

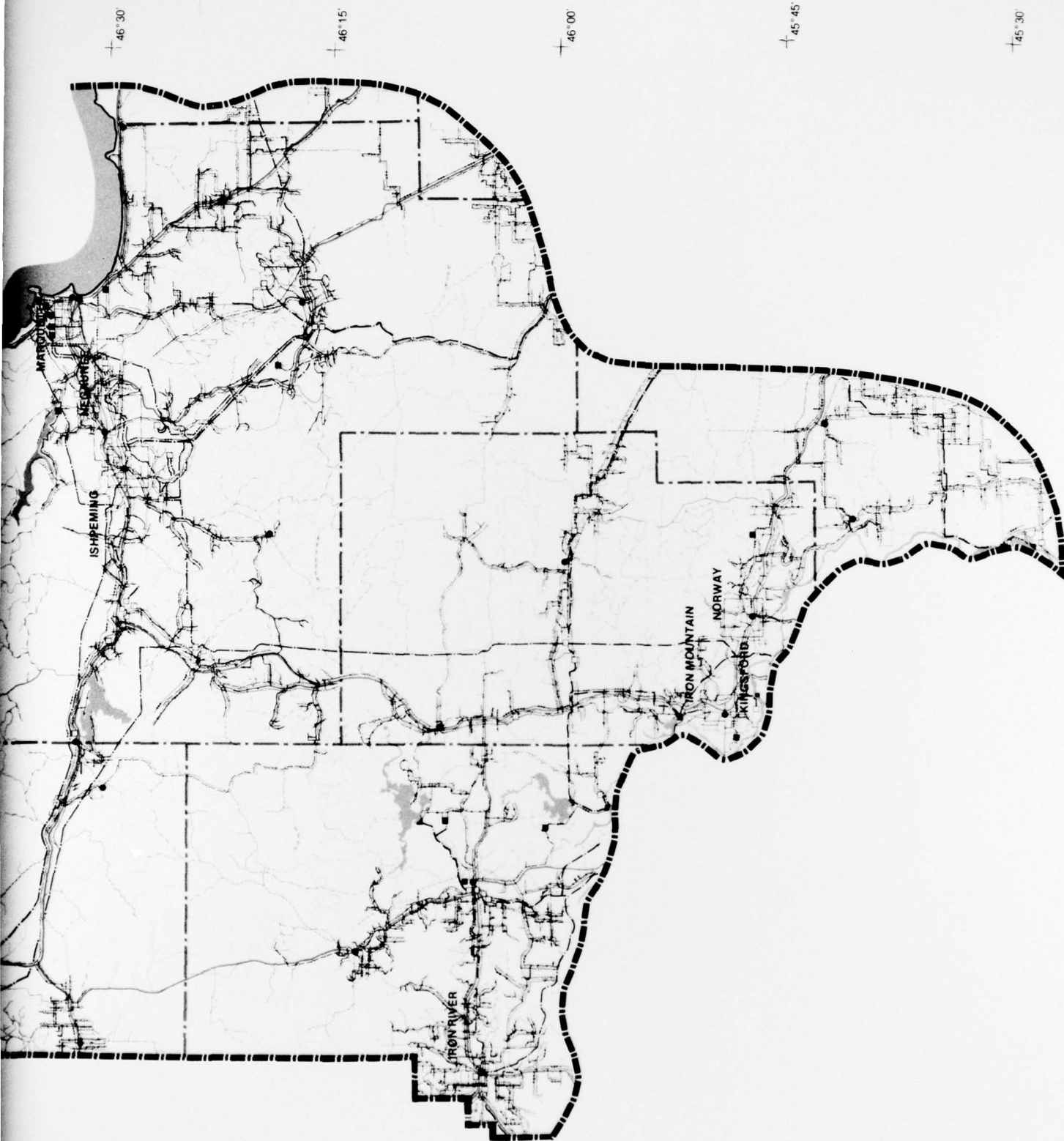
+ 87° 00'

+ 46° 45'

+ 46° 30'

+ 46° 15'





### Avoidance Features

Avoidance Features are shown on the map on the following page. The map depicts those features felt to represent the highest level of constraint and therefore, these areas have been excluded entirely from consideration for SEAFARER system siting\*.

Table 2 lists the features shown on the map. For a detailed discussion of the individual site features, see the following data books:

Book 5	Land Use
Book 7	Transportation
Book 8	Utilities
Book 9	Mineral Extraction
Book 14	Surface Water
Book 17	Cultural & Recreational
Book 19	Wildlife

A number of avoidance features such as cemeteries, quarries, nesting sites and historic sites have been shown as point data since the scale of mapping does not permit individual site configurations to be shown.

Many other environmental characteristics represent constraints to system siting (such as dense vegetation, steep topography, exposed bedrock, etc.) but none have been classified as absolute avoidance. Each data factor within each data category will be assessed in terms of the level of constraint it represents to system siting and will then be used in the siting analysis as part of a subsequent phase of work.

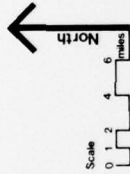
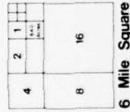
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\* The types of features to be treated as avoidances were identified by the Navy as part of system design specifications.

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## AVOIDANCE FEATURES

Quarries and Pits  
Park Sites with Campgrounds  
Small Parks and Picnic Areas  
Ski Areas  
Recorded View Points  
Archaeological Sites  
Historic Sites  
Nesting Sites  
Wildlife Flooding Areas

Q  
CG  
P  
S  
V  
AS  
HS  
N  
WF

Corporate Boundaries, Planned  
Developments or Special Preserve  
Areas  
Urban and Rural Settlements  
Railroads  
Pipelines  
Lakes and Reservoirs

A  
H  
C  
PF  
M

Airports  
Harbors  
Cemeteries  
Prison Facilities  
Mines

88° 45' 87° 00'

88° 30' 87° 15'

88° 15' 87° 00'

88° 00' 86° 45'

46° 45'

46° 30'

46° 15'

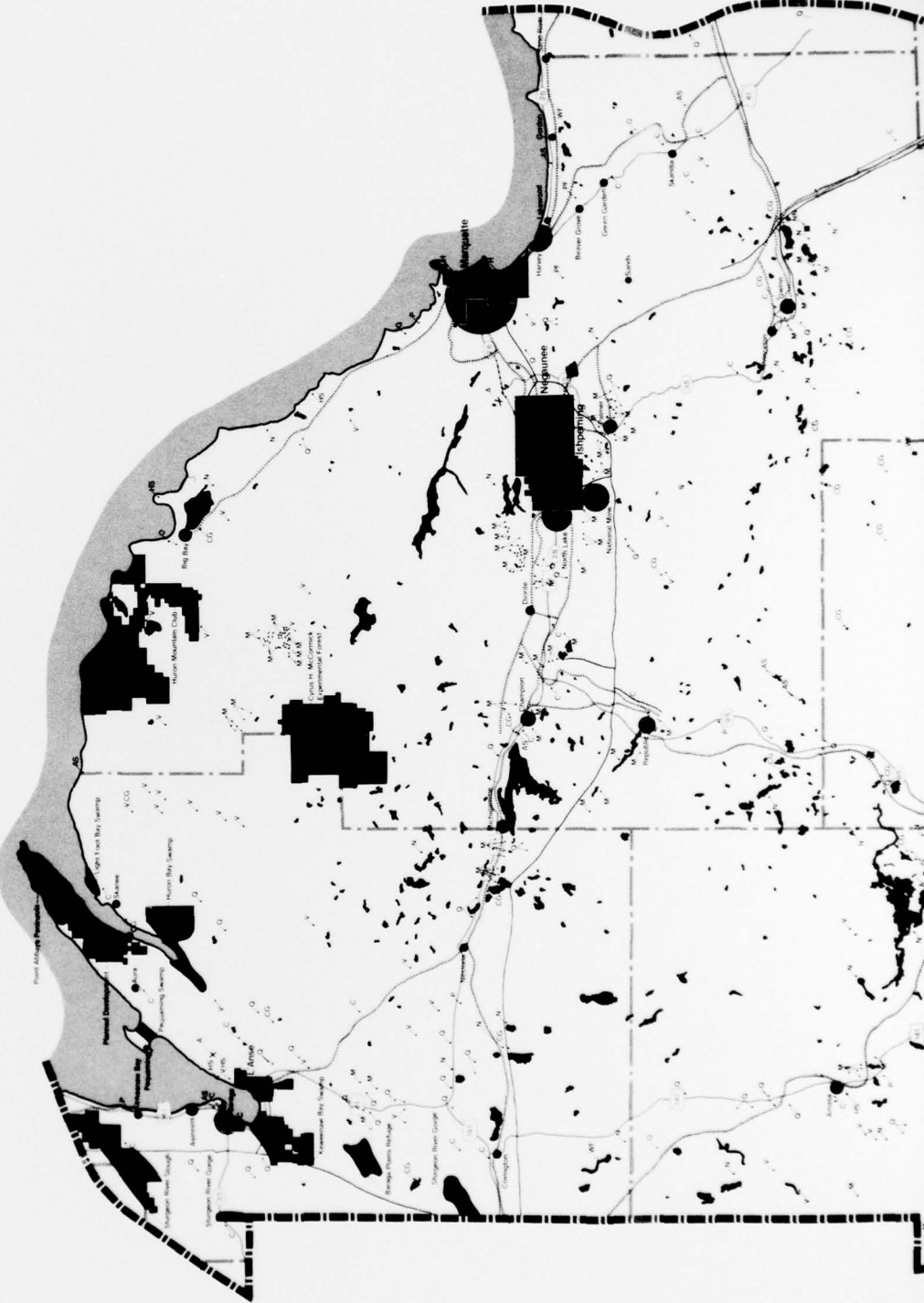






Table 2. AVOIDANCE FEATURES

<u>Data Category</u>	<u>Data Factor</u>	<u>Minimizes:</u>
Land Use	Corporate Boundaries Urban and Rural Settlements (U-1, U-2, U-3, R-1, R-2)	Mitigation Cost Operation and Maintenance Cost Social Cost
	Planned Developments	Mitigation Cost Operation and Maintenance Cost Social Cost
Transportation	Special Preserve Areas Sturgeon Gorge Keweenaw Bay Swamp Peguming Swamp Huron Bay Swamp Light Foot Bay Swamp Point Abbaye Peninsula Sturgeon Sloughs	Biological Cost Social Cost
	Cemeteries	Social Cost
Utilities	Prison Facilities	Social Cost
	Railroads (operational)	Mitigation Cost
Mineral Extraction	Airports	Mitigation Cost Social Cost
	Harbors	Social Cost
	Pipelines	Mitigation Cost
	Mines (active and inactive)	Construction Cost Mitigation Cost Social Cost

Table 2. AVOIDANCE FEATURES (continued)

<u>Data Category</u>	<u>Data Factor</u>	<u>Minimizes:</u>
	Quarries and Pits (active and inactive)	Construction Cost Mitigation Cost Social Cost
Surface Water	Lakes and Reservoirs	Construction Cost Social Cost
Cultural and Recreational	McCormick Experimental Forest	Biological Cost Social Cost
	Park Sites with Campgrounds	Social Costs
	Small Parks and Picnic Areas	Social Cost
	Recorded View Points	Social Cost
	Ski Areas	Social Cost
	Historic Sites	Social Cost
	Archaeologic Sites	Social Cost
Wildlife	Nesting Sites	Biological Cost Social Cost
	Wildlife Flooding Areas	Biological Cost Social Cost

